as exhibit a simpler structure than others, have probably diverged least from the primitive stock. We cannot too strongly insist upon the general recognition of the fact (self-evident though it be) that, in the present state of our knowledge, and in the almost total absence of palæontological evidence, our sketches of insect phylogeny, however useful and suggestive, cannot but be, to a large extent, purely tentative.

Some recent authors have regarded the *Crambidæ* as a totally distinct family from the *Pyralidæ*. Sir George Hampson recombines them, and divides the *Pyralidæ* into the following twelve sub-families: *Galleriinæ*, *Crambinæ*, *Schœnobiinæ*, *Anerastiinæ*, *Phycitinæ*, *Epipaschiinæ*, *Chrysauginæ*, *Endotrichinæ*, *Pyralinæ*, *Hydrocampinæ*, *Scopariinæ*, and *Pyraustinæ*.

Die Minerale des Harzes: eine auf fremden und eigenen Beobachtungen beruhende Zusammenstellung der von unserem heimischen Gebirge bekannt gewordenen Minerale und Gesteinsarten. Von Dr. Otto Luedecke. Pp. 643. Mit einem Atlas von 27 Tafeln und 1 Karte. (Berlin: Gebrüder Borntraeger, 1896.)

THIS elaborate Treatise on the Minerals of the Harz will be very useful, as a work of reference, to those who are in charge of mineral collections, and to all who are specially interested in those species with which the treatise deals. In it the author has placed on record the results of the observations made by him in the course of the last eighteen years, during which period he has examined the private and public collections of the region, and has visited the Harz localities both to satisfy himself on the spot as regards the existence of the minerals at the places mentioned, and to obtain information as to the modes of occurrence; these visits were facilitated by the nearness of the district to Halle, of which University Dr. Lüdecke is a distinguished professor. Further, the author has incorporated the results of the study of Harz minerals by other mineralogists. In the case of the more important species, such as Galena and Copper-pyrites, a brief sketch is given of the geological features of the districts in which the minerals occur. The treatise is accompanied by an atlas of twenty-seven plates (chiefly crystal figures and stereographic projections) and a very clear map of the region, photographically reduced from the one prepared by Borchers in 1865. Prof. Lüdecke has done a considerable service to Mineralogy by the publication of the results of so thorough an examination of this important mineral region.

The Wonderful Universe. By Agnes Giberne. Pp. 128. (London: Society for Promoting Christian Knowledge, 1897.)

TO the class of readers which finds pleasure in being oppressed and bewildered with information as to the "wondrous far distances," and especially to the members of it possessing a sentimental bias, Miss Giberne's book will successfully appeal. Among the titles of the eleven chapters are "The Silver Moon," "Fair Venus," "Red Mars," "Twin Giants," and "Stars of Light." What Miss Giberne has to say on these and other subjects comprised in her book can usually be depended upon; and, as might be inferred from the quoted titles, she aims at making her descriptions attractive. In the latter attempt, however, she is not altogether successful. A sprinkling of poetical extracts, a few lapses into the religious aspects of astronomy, some lugubrious humour, and a number of statements as to how long it would take to go to the moon and other places in an express train, make up much of Miss Giberne's latest volume. Still, the fact that the information can be trusted, and that it is very simple, is a recommendation.

There are no illustrations, not even in the chapter on "How to Learn the Heavens," and there is no index. A book on astronomy published with such omissions hardly possesses the qualifications for success.

The Story of Forest and Stream. By James Rodway, F.L.S. Pp. vi + 202. (London: George Newnes Limited, 1897.)

IN this little book Mr. Rodway sketches, in his best style, the life of trees in wood and forest, and indicates the lessons that it teaches. He points out the benefits derived by man and other animals from forests and streams, imparting the information in pleasing language, and presenting nature in many instructive aspects. The twenty-seven illustrations are the best that have yet appeared in any of the volumes in the Library of Useful Stories, to which series the present book belongs.

Mr. Rodway naturally devotes the largest share of attention to the forests of South America, for he is most familiar with the conditions which obtain in them. On this account, however, the plant-life described is somewhat limited, though here and there comparisons are made between the floras of the old and new worlds. A more appropriate title for the book would have been "The Story of Tropical Forest and Stream."

Quelques observations sur les Muscles Peauciers du Crane et de la Face dans les Races Humaines. By Théophile Chudzinski. Pp. 90. (Paris: Masson, 1896.)

THIS work gives an account of the arrangement of the superficial muscles of the head and neck in the different races of men. The muscles are described, and a series of measurements given for each in the different races. The general conclusion is what one would expect; namely, that these muscles of the superficial fascia are most marked in the black races, least so in the white, while in the yellow races they are intermediate in their development. The facial muscles of the negro are found to closely resemble those of the gorilla in their great development. M. Chudzinski draws attention to the diagramatic manner in which the muscles of expression are usually figured, and notes particularly certain very superficial layers which it is customary to remove in defining the edges of the muscles. The twenty-five figures, which are given at the end of the text, illustrate the comparative development of the muscles as seen in dissections of the heads of different races.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Meaning of the Symbols in Applied Algebra.

IF I had made a slip of the pen of the kind suspected by Mr. Cumming (p. 198), it would have been a serious error, because it constituted the essence of what I was writing about. I was sure that a number of teachers did not believe it, and I am obliged to Mr. Cumming for giving me another opportunity of emphasising what I believe to be a vital matter. He says "the multiplication of one length by another length [or, more generally, of one concrete quantity by another] is abhorrent to the mind of" certain mathematicians. Quite true, I know it. The idea was abhorrent to the mind of the late Mr. Todhunter, and I think that Prof. Greenhill has expressed himself in the same sense. But what then? That is exactly why the idea requires driving home; and until it is driven home there will be no real clearness or simplicity in dealing either with physical quantities themselves or with their numerical specification in terms of given "units."

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Mr. Cumming says that "$2Rh = d^2$ is an algebraic equation, and as such its symbols express numbers, not things." Whereas I say that truly it is an algebraic equation, and as such its symbols may express things and not numbers. A relation between numbers is an arithmetical equation, and is appropriate to the pure mathematician; by him algebra was first used, and he still clings to the ancient practice; but physicists have now made a perfectly legitimate step onwards and extended the scope of the science. Applied mathematics is concerned with things, and its symbols may properly be taken to represent concrete quantities (see, for instance, NATURE, vol. xxxviii. p. 282).

Mr. Cumming says that the equation is true in any units; but if he gave his boys R in metres, h in inches, and d in yards, or if he used it for finding the curvature of a lens, or the thickness of a Newton's-ring film, telling them at the same time that the symbols only represent numbers, they might be in a fog. A perfectly unnecessary fog, and that is the serious part of the business. Artificial difficulties obstruct the path of the beginner in regions which are quite easy, and hence it is that his progress into higher regions is so slow. Such difficulties need not exist. The golfer who keeps on the straight course is untroubled by bunkers and obstacles which infest the path of the wild driver.

If Mr. Cumming can spare time to reconsider the question, I know it needs an effort, *experto crede*, I am sure it will repay him.

I call the attention of those physicists who are already familiar with the straightforward mode of dealing with concrete quantities to the remarkable letter, by Mr. C. S. Jackson of the R.M. Academy, Woolwich, immediately preceding Mr. Cumming's; and, as he asks me a definite question, I answer $s = w/v$.

January 4. OLIVER J. LODGE.

The Force of a Pound.

MAY I suggest to Prof. Perry that it might be well to imitate the enemy's tactics and give a name to the unit of inertia on the pound-force system.

I would propose that, on this system, any piece of matter having the unit quantity of inertia or sluggishness be. for dynamical purposes, termed a "slug."

The foot-pound (force)-second system might then be equally well styled the foot-slug-second system, and under the aspect implied by this name would stand on precisely the same footing as the centimetre-gram-second, or the foot-pound (mass)-second system.

A "slug" would be an instructive object to contemplate Its virtues would be pretty accurately embodied in a a 32-lb. shot, which, in fact, is manufactured solely for the sake of its inertia, and is a body not unfamiliar even to athletic undergraduates in our universities.

I have taught dynamics for many years, both to unprofessional students and to engineers, and have remarked that the unit difficulty is felt far most strongly by the latter. This I attribute in part to the relative inadequacy of the linguistic training which many of my engineering students have received before entering on their professional studies. They are not well able to disentangle verbal confusions, and are resentful of them. Consequently a liability to trip, arising from some ambiguity of terms, which would be a stimulating challenge to a student of wider training, is an unmitigated nuisance to the engineer, who has no interest in this kind of thing, and does not wish to be bothered by it.

The difficulty is one of language and not of dynamics, and I am quite in sympathy with Prof. Perry's desire to get rid of it, and should adopt without hesitation a good text-book which employed the pound as the only unit of force, if I knew of such.

It should always be remembered that, to most students, the study of dynamics is the study of the new and unfamiliar property of inertia, and it is only reasonable that the new quantity should have a unit with a new and unfamiliar name.

Torquay, January 4. A. M. WORTHINGTON.

Sir William MacGregor's Journey across New Guinea.

IN NATURE of December 17, p. 157, you publish an article describing Sir William MacGregor's interesting journey across the South-eastern Peninsula of New Guinea, by Mr. J. Thomson. As he has introduced some reference to my work in the Possession, perhaps you will kindly allow me space for a few observations. The names of seven travellers, besides my own, are mentioned whose attempts "to explore the Alpine region of the Owen Stanley Range" have "resulted in signal failure." More than one of us, however, *did* reach the Alpine regions of the range, though none of us ascended Mount Owen Stanley. And I cannot think that any of those who made the attempt will feel any discredit attaching to them on that account, any more than attaches to Sir William MacGregor that he could not reach the mountains beyond the sources of the Fly River. That Sir William was the first to scale Mount Owen Stanley is true, and he deserves all the *kudos* he has received for his exploit. Yet the success which attended his efforts was in no small measure due to the information gathered by his forerunners, and even by their "signal failures." Each traveller made it easier for his successor; and Sir William mounted on the backs of all who had preceded him, however much the historiographer for New Guinea may try to ignore their efforts. The reason why some of us who made a not ill-considered effort at great personal expense to reach the summit of the Mount, failed in accomplishing all we desired, was chiefly one of money. Sir William, who has the resources, the steamers and the launches of the Possession at his back, and has besides the prestige of "Great Chief" over the natives—no mean factor in the exploration of such a country—and can call upon his officials in all quarters for aid, is in a very different position from a private traveller dependent very largely (I speak for myself) on his own resources, and *ought* to accomplish far more than any other traveller.

Mr. Thomson goes on to say: "It may be pointed out that there seems no doubt that Mr. Forbes did not see the highest crest of the mountain from his nearest approach to it, and it is almost certain that he could not have obtained access to the crown of Mount Victoria [Mount Owen Stanley] along the south-eastern spur of it. Concerning this accessible spur, which Mr. Forbes proposed ascending, Sir William MacGregor says, it is a mighty precipitous buttress, exceeding 12,000 feet in height, 'bristling with peaks and pinnacle-like rocks, and contains hundreds of inaccessible crags and precipices.'" Mr. Thomson's doubts about what I saw or did not see from my nearest approach to Mount Owen Stanley, are merely the expression of one having no personal knowledge of the country. But if Sir William MacGregor—for whose explorations I have the highest admiration—has said what Mr. Thomson puts into his lips at the close of the above extract, it is quite plain that he is not referring to the same feature that I have described. I took—and, if I mistake not, have published—a round of bearings upon "the highest crest," the most familiar object in my horizon for months. I approximately fixed the positions of and placed on my map names to these same crags and peaks; but the Lieutenant-Governor, following a custom not infrequent with him in regard to the geographical nomenclature of his predecessors in this and other regions of New Guinea, has renamed them. The "accessible spur" mentioned by me, however, was not "a mighty precipitous buttress"— a feature, according to the description, one would think, not altogether unrecognisable as such—nor yet a Primrose Hill; but it was a negotiable slope all the same, and on a less incline than some others ascended by me in the same country.

In conclusion, I cannot help again drawing the attention of cartographers and geographers to the fact that Sir W. MacGregor, after all that has been expressed at the Royal Geographical Society, and publicly by many writers, on the point, still claims for himself the honour of naming the chief mountain in the Possession, by persistently calling it Mount Victoria, instead of Mount Owen Stanley as it was christened nearly half a century ago by Huxley, and has been so inscribed on every map all those years. Prof. Huxley himself told me that the feature on which he bestowed the name Owen Stanley—in honour of as distinguished a commander and explorer as has ever sailed in those waters—was not the range, but the mountain, whose summit he saw rising clear above the clouds one early morning when the *Rattlesnake* was lying in Redscar Bay. Its position and altitude were then accurately determined.

HENRY O. FORBES.

The Museums, Liverpool, January 4.

Shooting Stars of January 2.

THE shower of shooting stars seen by Dr. H. C. Sorby on the morning of January 2, formed evidence of the return of a well-known meteor stream which has its radiant in Bode's modern

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